



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/665,298	09/17/2003	Michael C. Green	005513P018	5448
45288	7590	08/24/2007		
VARIAN/BLAKELY 1279 OAKMEAD PARKWAY SUNNYVALE, CA 94085-4040			EXAMINER LE, THAO X	
			ART UNIT 2814	PAPER NUMBER
			MAIL DATE 08/24/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/665,298

**Applicant(s)**

GREEN ET AL.

**Examiner**

Thao X. Le

**Art Unit**

2814

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-37, 49 and 50 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-37, 49 and 50 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## **DETAILED ACTION**

### ***Remarks***

1. The indicated allowability of claims 1-37 per telephone message with the Applicant's Attorney, Mr. A. Gaz, on 08/15/07, is withdrawn in view of the newly discovered reference(s) to Lee (6437339). Rejections based on the newly cited reference(s) follow.

### ***Response to Amendment***

2. The affidavit filed on 20 July 2007 under 37 CFR 1.131 is sufficient to overcome the Lee (US 6995375) reference.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-5, 7, 14, 16-20, 27-36, 49-50 are rejected under 35 U.S.C. 102(e) as being anticipated by US 6437339 to Lee et al.

Regarding claims 1, 49, Lee discloses a photodetector in fig. 3, comprising: a plurality of semiconductor materials 2300/2500, forming a heterojunction (first material is different from the second material), the plurality of semiconductor materials comprising: a first semiconductor material 2300 or 2500, col. 4 line 31; a second semiconductor material 2500 or 2300, col. 4 line 47, coupled to the first semiconductor material 2300, the first and second semiconductor materials being halides, col. 2 line 35 and col. 4 line 46, wherein at least one of the first and second semiconductor materials consists of a semiconductor material.

Regarding claims 2-4, 18, 50, Lee discloses the photodetector wherein the first and second semiconductor materials have approximately the same band gap (similar material), wherein the first material 2300 comprises an lead iodide compound, col. 2 line 35 and the second semiconductor material 2500 comprises mercuric iodide, col. 4 line 46.

Regarding claim 5, Lee discloses the photodetector further comprising: a first contact (bias electrode); and a second contact (collector electrode), wherein the first plurality of semiconductor materials are disposed between the first and second contacts, fig. 3.

Regarding claim 7, Lee discloses the photodetector wherein second semiconductor material comprises mercuric iodide and the first semiconductor material is less chemically reactive than mercuric iodide with the contacts.

With respect to "the first semiconductor material is less chemically reactive than mercuric iodide with the contacts", Lee discloses the materials that are

identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Regarding claims 14, 20, Lee discloses the plurality of semiconductor materials further comprises a third semiconductor material comprising lead iodide coupled to the second semiconductor material, col. 2 lines 32-40 (the charge generation layer 300 or 2300 can be HgI<sub>2</sub>, PbI<sub>2</sub>, a-selenium, others, and combination or subcombination thereof).

Regarding claims 16-17, Lee discloses the photoconductor wherein the second semiconductor material has a conductivity type different than the first semiconductor material, wherein the band gap of the first and second semiconductor materials are within 10 percent of each other.

With respect to "are within 10 percent of each other ", Lee discloses the materials that are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Regarding claim 18-19, Lee discloses the photodetector, wherein the first semiconductor material 2500 comprises mercuric iodide and the second semiconductor material comprises lead iodide and each of the first and second semiconductor

materials consists of a semiconductor material, wherein the second semiconductor material is thicker than the first semiconductor material, fig. 3.

Regarding claims 27-29, Lee discloses the photodetector is coupled to a negative bias, wherein the first contact is coupled to ground and the second contact is coupled to a negative voltage, fig. 3.

Regarding claim 30, Lee discloses a photodetector in fig. 3, comprising: a first semiconductor material 2500; a second semiconductor material 2300 coupled to the first semiconductor material 2500 forming a heterojunction structure; wherein at least one of the first and the second semiconductor materials consists of a semiconductor material, a contact (bias electrode) coupled to the second semiconductor material 2300, wherein the first and second semiconductor materials comprise means ( $\text{HgI}_2$ ) for reducing a chemical reaction with the contact; and means  $\text{PbI}_2$  for reducing dark current in the heterojunction structure..

With respect to "means for reducing chemical reaction with the contact", Lee discloses the materials that are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Regarding claims 31, 49, Lee discloses a photodetector in fig. 3, comprising: a first semiconductor material 2300; and a second semiconductor material 2500 coupled to the first semiconductor material 2500; wherein at least one of the first and the second semiconductor materials consists of a semiconductor material; a contact (electrode)

coupled to the second semiconductor material 2300; wherein the second semiconductor material is less corrosive than the first semiconductor to the contact.

With respect to "the second semiconductor material is less corrosive than the first semiconductor to the contact ", Lee discloses the materials that are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 195 USPQ 430, 433 (CCPA 1977) and MPEP 2112.01.

Regarding claims 32-36, 50, Lee discloses the photoconductor wherein the first and second semiconductor materials are halides or iodide, wherein the second semiconductor material is mercuric iodide, col. 4 line 46.

### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 6, 8-13, 15, are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6437339 to Lee et al. in view of US 6353229 to Polischuk et al. of record.

Regarding claim 6, Lee discloses the photodetector wherein at least one of the first and second contacts comprise transparent electrode, col. 2 line 29.

But Lee does not disclose the photodetector wherein at least one of the first and second contacts comprise palladium.

However, Harel discloses the photodetector electrode consisting of ITO or palladium, see claim 18 and 19; and Polischuk discloses the photodetector electrode consisting of palladium, ITO (transparent), or Au col. 5 lines 54-57. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use the electrode teaching of Polischuk to replace the Au electrode of Lee, because such material substitution would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06.

Regarding claims 8-13, 15, Lee does not expressly disclose the second semiconductor thicker than the first semiconductor, wherein the first semiconductor has a thickness less than about 250 micron or 50 micron, and wherein the thickness of third semiconductor layer less than 50 micron.



But, Lee discloses the first semiconductor material 2300 has a thickness of about 10V/micron, col. 4 line 49 and the second semiconductor layer 2500 is thinner than layer 2300 as depicted in fig. 3. Accordingly, it would have been obvious to one of ordinary skill in art to use the thickness teaching of Lee in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation; MPEP 2144.05.

8. Claims 21-26, 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6995375 to Lee et al. in view of US 6949750 to Tsutsui et al of record.

Regarding claims 21-26, 37, Lee discloses the photodetector wherein at least one of the first and second semiconductor materials comprises iodide compound, wherein the second semiconductor material 7 comprises mercuric iodide or lead iodide, see claim 20.

But Lee does not disclose the first semiconductor material comprises bismuth iodide or thallium bromide.

However, Tsutsui discloses a photo conversion layer 4 can include various materials such as bismuth iodide, thallium bromide, lead iodide, or mercury iodide, col. 6 lines 17-30. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to use the photo conversion material teaching of Tsutsui to replace the photo conversion material of Lee, because such material substitution would have been considered a mere substitution of art-recognized equivalent values, MPEP 2144.06.

***Response to Arguments***

9. Applicant's arguments with respect to claims 1-37 and 49-50 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X. Le whose telephone number is (571) 272-1708. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on (571) 272 -1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

21 Aug. 2007  
/Thao X Le/  
Primary Examiner, Art Unit 2814